Preparation for AIRS Data Assimilation, Validation and Impact Testing at the National Centers for Environmental Prediction (NCEP)

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A Multi-organizational Effort

NCEP

Derber
Woollen
Van Delst
Woollen
Treadon

NESDIS/ORA

McMillin
Kleespies
Goldberg
Wolf

NASA/DAO

Joiner

Integration and Testing of New Observations

1) Data Access (routine, real-time)
2) Formatting and establishing operational data base
3) Extraction from data base
4) Analysis development (I)
   - forward model
   - integration into analysis code
   - development of data monitoring statistics
5) Preliminary evaluation
   - "passive monitoring"
   - statistics of data/forward model from model guess
6) Quality control
   - bias correction
   - cloud detection
   - decision-making algorithms
   - tuning

Integration and Testing of New Observations (continued)

7) Analysis development (II)
- linear tangent, adjoint, jacobian models
- integrate into analysis code
- revise data selection (e.g. channels)
- continue to develop monitoring statistics

8) Assimilation testing and forecast evaluation
- low resolution tests
- full suite of model and analysis diagnostics
- >1 month of results

9) Operational implementation
- **efficiency to meet operational schedules**
- **non-negative forecast results**
- integrate into current operational system
- monitor data receipts and quality through qc diagnostics
- implement with NCEP Central Operations (NCO)
- monitor post implementation results

10) Maintain system
- ongoing incremental improvements ('til death do us part)
- adapt to future changes (formats, computers, internal code upgrades, NCO requirements)

Activity	Who	Status
1) Data Access (routine, real-time)	NESDIS Goldberg, Wolf	Simulated data produced (228 channel selection)
2) Formatting and establishing operational data base	Woollen, Wolf UKMet, ECMWF	Formats established Complete by mid-January
3) Extraction from data base	Woollen	Complete by mid-January
4) Analysis development (I) - forward model - integration into analysis code - development of data monitoring statistics	Derber Van Delst Joiner	Mostly implemented operationally at NCEP by February Needs OPTRAN coefficients
5) Preliminary evaluation - "passive monitoring" - statistics of data/forward model from model guess	Derber Treadon	Beginning with simulated AMSU, HSB data; AIRS when OPTRAN coeffs available Differences with real obs??
6) Quality control - bias correction - cloud detection - decision-making algorithms - tuning	Joiner Derber Van Delst	Completion: +2-3 months after real observations are available and physically correct

Activity (continued)	Who	Status
7) Analysis development (II) - linear tangent, adjoint, jacobian models - integrate into analysis code - revise data selection (e.g. channels) - continue to develop monitoring statistics	Van Delst McMillin Kleespies Derber	Ongoing Complete by March Current NCEP code is backup Revised data selection takes additional >6 months First implementation complete by March
8) Assimilation testing and forecast evaluation - low resolution tests - full suite of model and analysis diagnostics - >1 month of results	Derber Joiner Van Delst	Requires final spectral response functions (revised QC) Evaluate AIRS, AMSU, HSB #6 + 4 months
9) Operational implementation **- efficiency to meet operational schedules** **- non-negative forecast results** - integrate into current operational system - monitor data receipts and quality through qc diagnostics - implement with NCEP Central Operations (NCO) - monitor post implementation results	Derber Van Delst NCEP/NCO	Acceptable #8 + 2 months minimum (Subject to some factors beyond EMC's control)
10) Maintain system - ongoing incremental improvements ('til death do us part) - adapt to future changes (formats, computers, internal code upgrades, NCO requirements)	All investigators	Forever

Expectations:

AMSU-A/HSB (AMSU-B)

NOAA-15
NOAA-16
Aqua

Impacts: + 3 h (NH), +6 h (SH) from first AMSU-A instrument
Much smaller (but positive) impact from
- Additional data from same instruments
- Additional instruments

IR

NOAA-15
NOAA-16
GOES-8/10 (U.S. domestic)
Aqua

AIRS: Higher resolution IR instrument

Need scientific development for AIRS data assimilation:

- **Cloudy radiance development**
- **Improved background covariances for high horizontal/vertical resolution data**
- **Improved forward model**
- **Land and Ice surface QC and surface emissivity**